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**Examining the Role of Religiosity in Moral Cognition, Specifically in the Formation of Sacred Values, and Researching Computational Models for Analyzing Sacred Rhetoric and its Consequential Emotions**

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Final Report

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The overall goal of this project was to research and develop computational text analysis techniques for tracking and detecting transformations in moral concerns of different cultural groups with regards to different religious and social issues. Our efforts in this project extended contemporary attempts for detecting linguistic features related to emotions and sentiment by coupling this research with a distinct theoretical emphasis on the underlying cognitive factors that influence moral rhetoric and, perhaps more importantly, how these factors unfold over time in (sometimes) predictable patterns.

Specifically, we researched and developed text analysis techniques for measuring the moral loading of concepts as they are used in a corpus. These methods are especially useful for the study of online corpora as it allows for the rapid analysis of moral rhetoric in texts such as blogs and tweets as events unfold. One of these methods uses Latent Semantic Analysis to compute the semantic similarity between concepts and moral keywords taken from the Moral Foundation Dictionary (Haidt, Graham, & Joseph, 2009). This measure of semantic similarity represents the loading of these concepts on the five moral dimensions identified by Moral Foundation Theory. We demonstrate the efficacy of this method by applying it in analyzing different concepts and corpora. Specifically, we used this technique to analyze the time line of moral loading of issues such as the World Trade Center, Ground Zero Mosque and abortion in three different online corpora.

We also used this method to analyze moral rhetoric used in Twitter by investigating the tweets regarding the 2013 federal government shutdown; a topic that was at the forefront of U.S. politics in late 2013. Our results demonstrate that the positions of the members of the two major political parties are mirrored by the positions taken by the Twitter communities that are aligned with them. We also analyzed retweeting behavior by examining the differences in the moral loadings of intra-community and inter-community retweets. We find that retweets in our corpus favor rhetoric that enhances the cohesion of the community, and emphasize content over moral rhetoric. We argue that the method proposed by us contributes to the general study of moral cognition and social behavior.

In a related line of work, using a combination of machine learning techniques, the LSA technique discussed above, and network analysis, we show that we can predict how moral concerns of the users (determined automatically by their past message history) can

be used to predict their behavior on Twitter. More importantly, we have recently demonstrated the existence of moral homophily within social networks. Social scientists have long recognized the importance of homophily (love of the same) for social bonds – that “birds of a feather flock together” (c.f., Lazarsfeld & Merton, 1954; McPherson et al., 2001). However, most of this research has emphasized how individuals associate or bond with similar others based on demographics such as age, gender, or socioeconomic status (e.g., Kossinets & Watts, 2009). More recently, scholars have identified moral values as another source of homophily (e.g., Vaisey & Lizardo, 2010). People prefer more social and physical distance from others who disagree with them on moralized social issues (Skitka, Bauman, & Sargis, 2005). Individuals also prefer to live in communities with ideologically similar others and will express desire to move when they are the ideological minority (Motyl, Iyer, Oishi, Trawalter & Nosek, 2014). Although we have enough evidence to believe that moral homophily plays a role in tie formation, we know very little about what types of moral similarities matter in this process. In a recent study (Dehghani, Johnson, Sagi, Garten, Parmar, Vaisey, Iliev, & Graham, 2015), we investigated whether moral concerns can be used to determine the distance between individuals on the social network. Using a combination of machine learning techniques and network analysis, we have been able to show that purity homophily plays a significant role in the formation of clusters in social networks. Specifically, we found that purity differences strongly predict social distance. We followed up our observational Twitter study with a series of behavioral experiments which replicated the finding that differences in purity play a more significant role than other moral concerns.

Apart from providing new techniques for collecting information about properties of decision-making of different groups, our work has added to our basic knowledge of human decision-making and the influence of devoutness to a belief system on decision-making. Our techniques can be vital tools for tracking changes in the modes of decision-making of adversaries, and in understanding how and when sacred values form. Consequently, the research will significantly aid in detecting when “rational actors” morph in to “devoted actors”.

The funds were also used in the following two additional projects:

1. Effects of Moral Concerns on Negotiations: There is now considerable evidence that emotion plays an important role in negotiation. Emotions, such as anger and happiness, affect concession-making, not only in human vs. human negotiations but also in human vs. agent negotiations. Recent research has demonstrated the impact of emotional expressions in morally-charged negotiations. Thus, taking people's moral concerns into account is crucial for building agents that operate in morally sensitive domains. This line of work explores the interplay between people's moral concerns, emotional expressions and concession-making during a morally charged negotiation. Our results demonstrate that participants who have stronger concerns for the Individualizing foundations (Harm and Fairness) make greater concessions for sacred negotiation items when faced with a sad opponent than an angry opponent. Also, we find that participants who have high Binding foundations (In-group, Authority and Purity) are more sensitive to social status, and make greater concessions in scenarios that involve agents in a higher social status.

2. The Subtlety of Sound: Accent as a Marker for Culture: Aspects of language, such as accent, play a crucial role in the formation and categorization of one's cultural identity. Recent work on accent emphasizes the role of accent in person perception and social categorization, demonstrating that accent also serves as a meaningful indicator of an ethnic category. In this line of work, we investigate whether the accent of an interaction partner, as a marker for culture, can induce cultural frame-shifts in biculturals. We have done three experiments, performed among bicultural and monocultural individuals, in which we test the above hypothesis. Our results demonstrate that accent alone can affect people's cognition. Our results have implications for both human-human interactions, as well as human-computer interactions.

## Publications:

- Dehghani, M., Khooshabeh, P., Nazerian, A., Gratch, J. (2014). The Subtlety of Sound: Accent as a Marker for Culture. *Journal of Language and Social Psychology*.
- Iliev, R., Dehghani, M., Sagi, E. (2014). Automated Text Analysis in Psychology: Methods, Applications, and Future Developments. *Language and Cognition*.
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- Kim, E., Dehghani, M., Kim, Y. K., Carnevale, P. J., Gratch, J. (2014). Effects of Moral Concerns on Negotiations. In To be published in In the proceedings of 36th Annual Conference of the Cognitive Science Society (CogSci (Ed.), In the

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- Dehghani, M., Khooshabeh, P., Huang, L., Nazarian, A., Gratch, J. (2012). Using Accent to Induce Cultural Frame-Switching. Proceedings of CogSci 2012.

1.

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**Principal Investigator Name****The full name of the principal investigator on the grant or contract.**

Morteza Dehghani

**Program Manager****The AFOSR Program Manager currently assigned to the award**

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**Reporting Period End Date**

08/01/2015

**Abstract**

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- Dehghani, M., Khooshabeh, P., Nazerian, A., Gratch, J. (2014). The Subtlety of Sound: Accent as a Marker for Culture. *Journal of Language and Social Psychology*.
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**Technical Summary**

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